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bracts small. The latter in both genera are in two series, provided we count as a second series the 2 or 3 quite short outer bracts at the base of the anthodia of *Hartwrightia*. The genus therefore should be inserted after *Allomia*, in Durand's Index, under number 2441 b. This disposition is concurred in by the late Dr. Sereno Watson, whose kindly counsel in this and other matters is gratefully acknowledged.

Explanation of Plate CLX.

Hartwrightia Floridana, A. Gray.

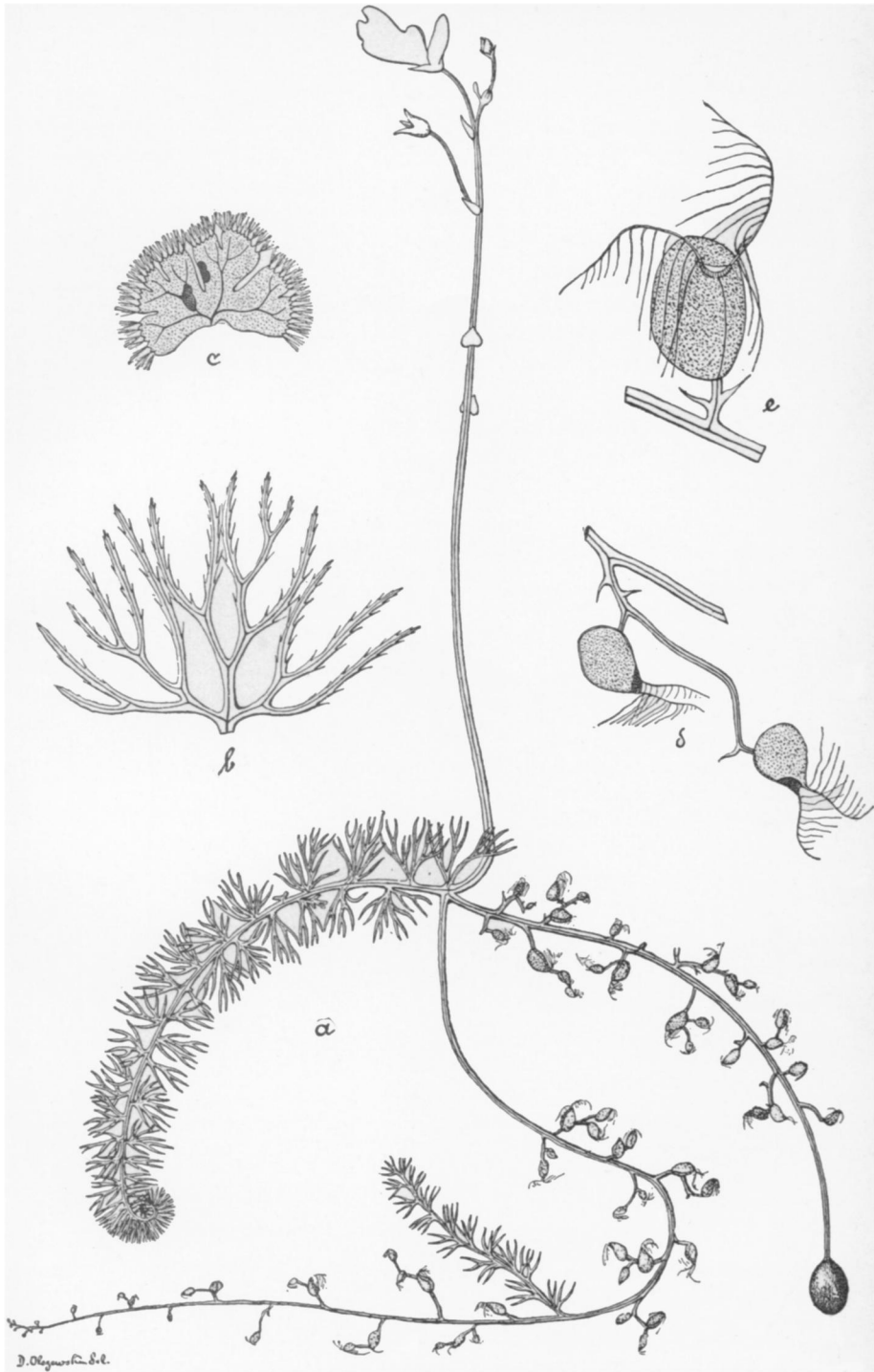
- a. An anthodium.
- b. A floret.
- c. A corolla, laid open, viewed from within.
- d. An anther, showing the appendage at the apex.
- e. An achenium.
- f. The style and stigmas, viewed from two directions.
- g. Cross-section of an achenium.

The Winter Buds of *Utricularia*.

BY JOHN M. HOLZINGER.

(PLATE CLXI.)

In the summer of 1891 Dr. J. H. Sandberg, collecting in Northern Minnesota, sent to the United States Department of Agriculture a *Utricularia* (No. 516) which seems to be *Utricularia intermedia*, Hayne, though the details of leaves do not agree with Reichenbach's figures of this species. The specimens all have the good hibernacula or winter buds, to which reference is made in Gray's Synoptical Flora, Vol. ii., Part I, p. 315, as "hybernacular tuber-like buds." In these specimens they are about 6 mm. in diameter, and of the shape of a small bird's egg. They consist of numerous broadly palmate scales (Fig. c), crowded along the short axis, and standing out at right angles from it. These scales are beset along the margin with tufts of bristles, which, falling on the outside of the bud, give it the appearance of a small hairy cocoon. Its structure thus hardly warrants the use of the term "tuber-like."



UTRICULARIA INTERMEDIA, HAYNE.

The only specimen in the National Herbarium, among the all species of this genus that has a single winter bud represented, is one of *U. intermedia* collected by Engelmann in Germany in 1829; showing how little attention collectors have paid to this interesting organ on the submerged stems of *Utricularia*. Young leaves—for this is what these bristle-margined bodies from the buds seem to be—from Engelmann's specimen agree exactly with those from the Minnesota plants. At first orbicular, passing nearly around the axis, and having only a few primary incisions, they soon begin to branch out dichotomously, the bunches of bristles marking the apices of the leaf-divisions. This is shown in Engelmann's specimen, in which the bud begins to develop ordinary leaves at one end. The tufts of bristles thus at last become scattered, and persist as sharp teeth along the edges of the narrow leaf-divisions.

Reichenbach, in *Icones Fl. Germ.*, figures two hibernacula of *Utricularia vulgaris*, representing them as of about twice the diameter as those of *U. intermedia*. Under *U. major* he states that he collected the hibernacula of this species abundantly near Leipzig, but found them never glutinous as in *U. vulgaris*. No figure of these buds is given. But for *U. minor* there is figured a leaf with a bud ("gemma"), which may be partly developed hibernaculum. The bud opens circinnately, as do the growing ends of the ordinary leaf-bearing branches in the Minnesota plants (see Fig. a). And in case of the hibernacula this mode of unfolding appears improbable till established by observation. Reichenbach describes and figures two more species, *U. intermedia* and *U. Bremii*, but in neither case gives a reference or a figure of hibernacula.

Some discrepancies should be mentioned between the leaves and bladder-appendages of *U. intermedia*, as figured in Reichenbach, and as actually appearing in the specimens. In the figure the leaf divisions are represented as tapering uniformly like spines, and show no mid-vein; in the Minnesota specimens the leaf divisions are more ribbon-like, narrowing to a point only near the apex, and there is a distinct vein running to the apex of each division (Fig. b). The bladder in Reichenbach's figure has strong few-toothed appendages about one-third the length of the bladder; in the plant under consideration these appendages are as long or longer

than the bladder, and are very slender branching filaments (Figs. e, f), somewhat like those figured in Reichenbach for *U. minor*, but with branches more slender and more numerous. The figure and the specimens agree in that the base of the flowering stem sends out two kinds of simple or nearly simple branches, one bearing only leaves, the other, more slender, bearing the bladders. In the fresh specimens these latter branches are seen to be furnished with leaves also, but these are smaller and more distinct than on the other branches. And the bladders, in fact, develop on these more scattered leaves, some of the leaf divisions always remaining distinct. This also is not well shown in Reichenbach's figure.

The hibernacular buds, finally, in this species may occur either on the leafy branches or on those with bladders. There is generally one, rarely more than two, on a plant, so far as appears from the specimens in hand. And they are always on a naked stalk or branch one to two inches long.

In the close observation of the presence, structure and development of the hibernacula in the different North American species of *Utricularia*, there is open an inviting field to some enterprising field botanists favorably located for such a task.

Explanation of Plate CXLI.

Utricularia intermedia.

- a. A plant, reduced $\frac{1}{2}$.
- b. Leaf, enlarged.
- c. Scale from bud, enlarged.
- d, e. Bladder-bearing leaves, enlarged.

Notes on *Nasturtium Armoracia*.

BY CHARLES A. DAVIS.

Three years ago the attention of the writer was incidentally attracted to this plant, and a series of observations was made on the occurrence on it of pinnatifid leaves, the results of which were published in the BULLETIN.

Since that time the plant has been the source of much interest, from various structural peculiarities, of which no previous study